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Equipment using a translucent screen and rear projection has made it possible to project motion pictures in daylight (daylight projection). Films can be shown repeatedly when formed into a film loop (continuous loop projection). Daylight projection and continuous loop projection were used to investigate the following questions: (1) Are film loop demonstrations projected in daylight as effective as demonstrations by a live instructor? (2) Are demonstrations more effective when interspersed with practice? and (3) Is coaching of the individual during practice more effective than no coaching?

The experiment was divided into sub-studies. In each, the task to be learned was a series of four tumbling skills each of different levels of difficulty. Physical education classes at the Pennsylvania State College served as the experimental population. In the first study, four different teaching procedures were used to study variables of massed versus interspersed showings and movies versus live instructors. In the second study, four different teaching procedures were used to study the effect of coaching during practice and of regulated interspersion of movie demonstrations and practice versus free choice of the learner to view the films as he wishes.

The results of testing 100 men indicated that: (1) Film demonstrations projected by means of film loops in daylight proved as effective as a live instructor's demonstration. (2) Demonstrations interspersed with practice were not more effective. (3) Coaching of the individual during practice was significantly superior to not coaching. (4) Daylight projection of film loops was a practical way of providing on-the-spot film demonstrations in perceptual-motor training.

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EVALUATION OF A PROCEDURE FOR USING DAYLIGHT PROJECTION OF FILM LOOPS IN TEACHING SKILLS

Human Engineering Report SDC 269-7-25

Under Contract N6onr-269, T.O. VII
With The Pennsylvania State College
Instructional Film Research Program
State College, Pennsylvania

Research conducted by:
S. F. Harby

May 1952

Report prepared by the Instructional Film Research Program

FOR THE PENNSYLVANIA STATE COLLEGE

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OFFICE OF NAVAL RESEARCH
SPECIAL DEVICES CENTER
HUMAN ENGINEERING DIVISION

Equipment using a translucent screen and rear projection has made it possible to project motion pictures in daylight (daylight projection). Films can be shown repeatedly without rewinding when formed into a film loop (continuous loop projection). These two techniques have been used in this research to discover:

1. In teaching a skill (athletic) are film loop demonstrations of the task projected in daylight as effective as demonstrations by a live instructor?

2. Are demonstrations more effective when interspersed with practice?

3. Is coaching of the individual during practice more effective than no coaching?

Results:

From the results of testing 100 men it was found that:

1. film demonstrations projected by means of film loops in daylight proved as effective as a live instructor's demonstration.

2. demonstrations interspersed with practice were not more effective

3. coaching of the individual during practice was significantly superior to no coaching.

4. Daylight projection of film loops is a practical way of providing on-the-spot film demonstrations in perceptual-motor training.

Recommendations:

1. Where simple skills need to be taught and instructors are in short supply daylight projection and film loops are recommended.

Project Engineer

Acting Head, Applications Research Section

Head, Program Branch

EVALUATION OF A PROCEDURE FOR USING DAYLIGHT PROJECTION OF FILM LOOPS IN TEACHING SKILLS

Investigation Conducted By

S. F. Harby

Instructional Film Research Program
The Pennsylvania State College

PROBLEM

The recent development of equipment which makes rear projection of film loops on translucent daylight screens more efficient has increased the possibilities of integrating filmic instruction with the practical requirements of perceptual-motor training. (See Fig. 1, page 2)

By way of exploiting the special facilities of this type of projection, four variables were subjected to study in the present experiment. The specific problem was to determine the effects of these four variables on the learning of tumbling skills by College students. The variables investigated were:

1. Mode of presenting the demonstration. ... a motion picture demonstration projected in daylight as effective as a live instructor's demonstration for teaching tumbling skills?

2. Distribution of demonstrations and practice. Are demonstrations (whether live or by means of film) better when they are interspersed with practice or when they are massed together and are followed by practice?

3. Kind of interspersion of film demonstrations with practice. Are three movie demonstrations interspersed with three two-minute practice periods more effective than the free choice of students to view a continuous film demonstration when and as they wish during practice?

4. Degree of coaching. Is coaching of the individual during practice more effective than no coaching?

The hypothesis was that the experiment would yield positive answers to these four questions.

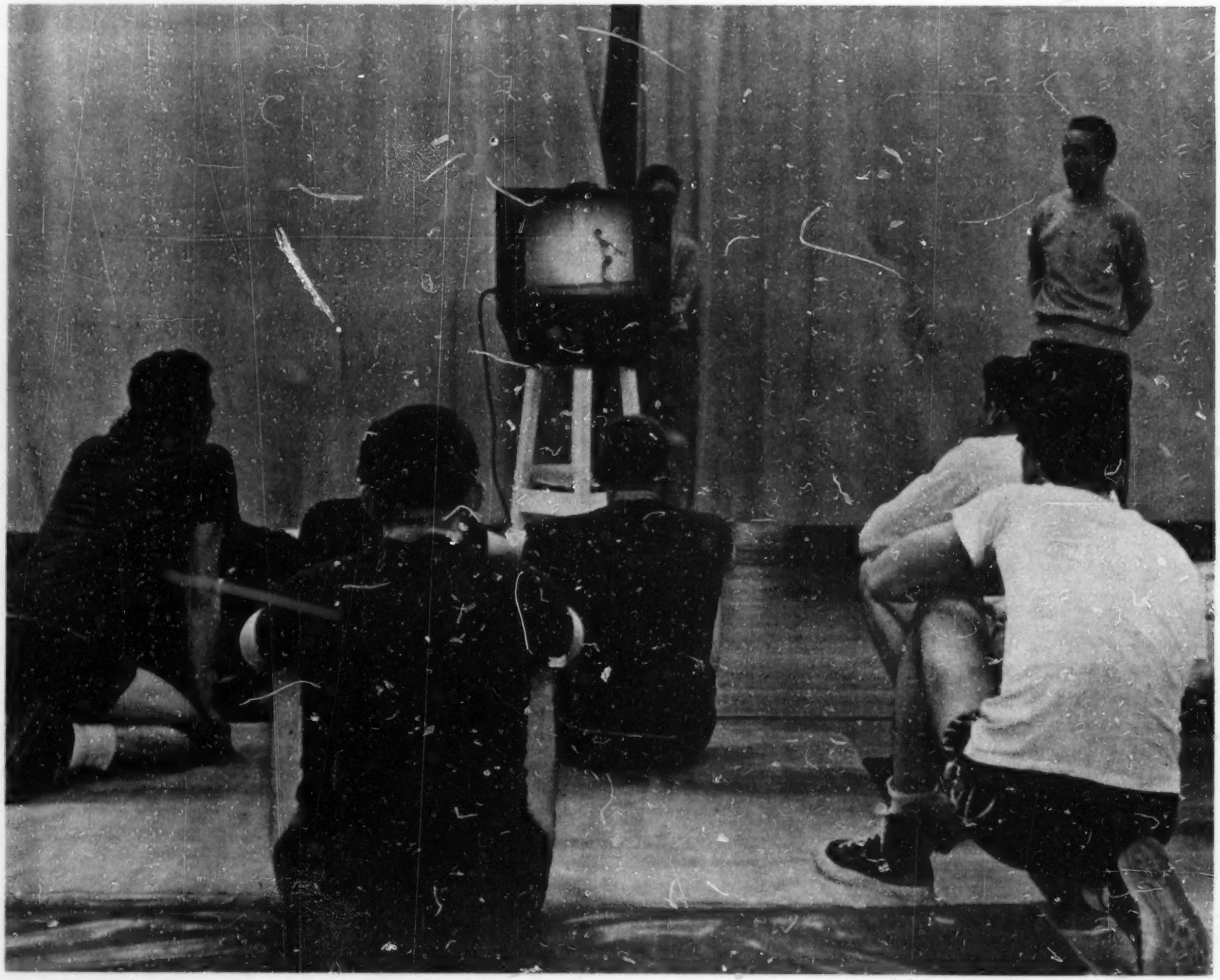

Fig. 1 Daylight Projection of Film Loops

DESIGN AND PROCEDURES

The experiment was divided into two sub-studies, each of which was arranged for latin square analysis.

Four physical education classes at The Pennsylvania State College served as the experimental population. These same four classes were used in both sub-studies. The sub-studies were carried out concurrently. The classes were substantially equal on the Metheney Modification of the Johnson Motor Educability Test, given as a pre-test.

Task

The task to be learned in Study A was a series of four tumbling skills: Backward Roll, Cartwheel, Handspring, and Front Somersault.

The task to be learned in Study B was a series of four tumbling skills: Dive Roll, Handwalk, Kip, and Back Handspring.

Skills are listed above in order of increasing difficulty. Those in the first series were considered to be equated in difficulty with the tumbling skills in the second series.

Tests

Two tests were used to measure learning of the skills:

1. Daily Performance Ratings. The two instructors who managed the classes rated individual performance on the skill taught on a given day.

2. Final Performance Ratings. Three independent judges who did not otherwise participate in the experiment rated all of the men in the experimental population on each of the eight skills. Standard criteria for rating gymnastic skills (as used in gymnastic meets) were used by both the instructors and the independent judges.

Separate final analyses were made of the daily performance ratings and the final performance ratings.

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[1] See page 7.

Films

Short (two-minute) sound motion pictures were prepared to demonstrate each of the eight tumbling skills. These films were arranged for loop-projection (i.e., the head of each film was spliced to its own tail to make a continuous loop). A given film could thus be shown over and over again without rewinding or re-threading and with no delay between the end of one showing and the beginning of the next.

Special Equipment

The equipment used for the daylight projection of film loops in the experiment consisted of two units which were used in conjunction with each other. These units were:

1. A daylight rear projection unit. (See Fig. 1, page 2)

2. A Continuous Film Magazine.[2] (See Fig. 2, page 5)

The Continuous Film Magazine used in this experiment is a self-driven continuous film mechanism which is designed to feed and take up 16mm film loops up to 200 feet in length. It is easy to load and imposes very little wear on the film. It may be used in conjunction with any standard projector.

This equipment permitted the experimenter to project films in the training area and facilitated the study of the free-choice and massed-versus-spaced variables. Using the equipment, it was possible to arrange massed showings of films with minimum delay; to provide continuous showing of a film for the free-choice viewing by learners during practice (free choice variable); and to minimize the delay between interspersed film-viewing and practice. Projection was carried out in the gymnasium in the practice and testing area in full daylight.

Teaching Procedures

In Study A, there were four different teaching procedures used to study two variables: (1) massed (consecutively repeated showings) vs. interspersed, and (2) movie vs. live instructor. These procedures were:

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2 The "Telekit" and T. A. Repetitive Impact Continuous Film Magazine, made available for the experiment by Television Associates, Inc., Michigan City, Indiana.

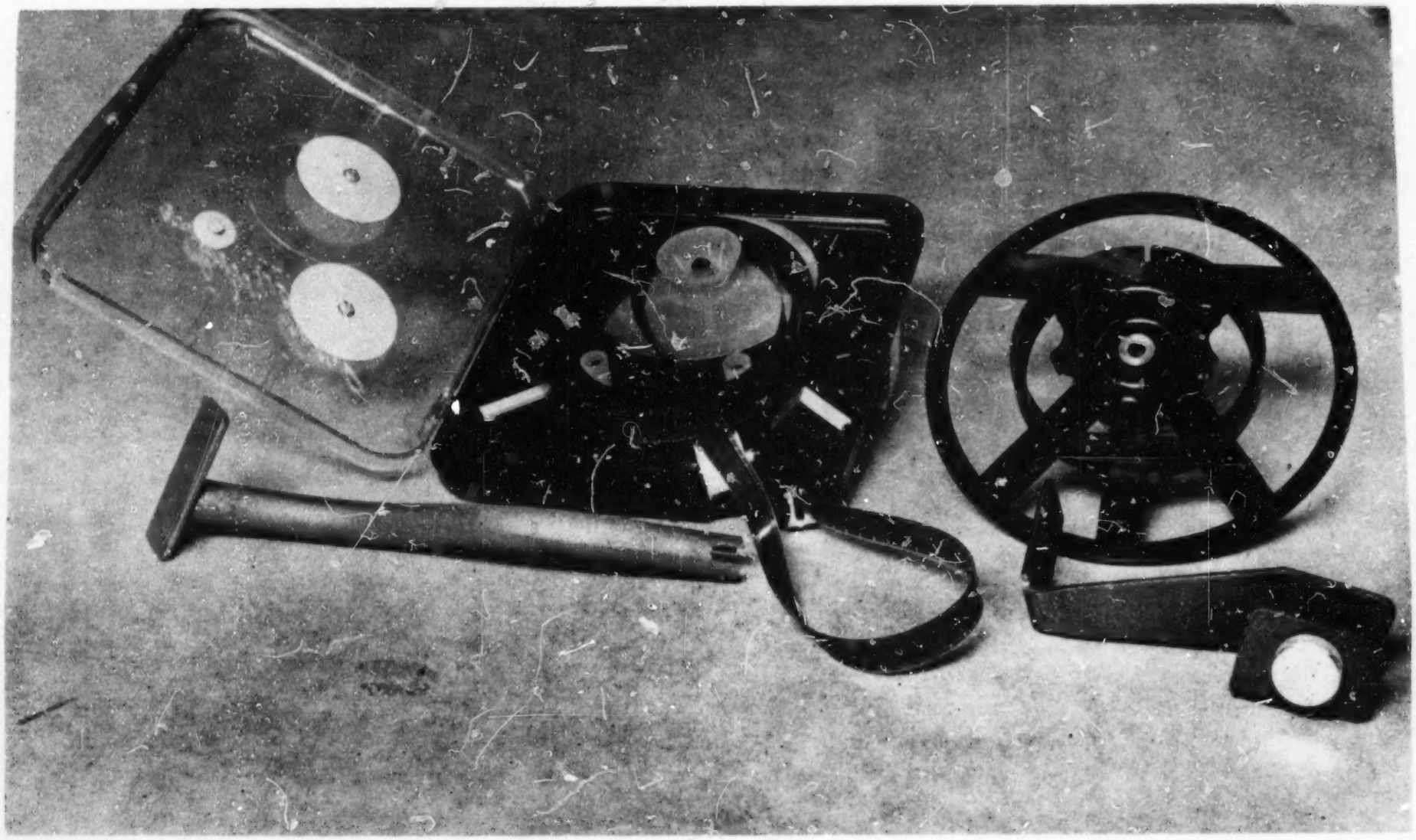

Fig. 2. Film loop magazine with loading mandrel and adapter arm for a standard projector.

Procedure a. Three massed live demonstrations (two minutes each) followed by practice (6 minutes). Total time: 12 minutes.

Procedure b. Three massed movie demonstrations (two minutes each) followed by practice (6 minutes). Total time: 12 minutes.

Procedure c. Interspersed live demonstrations: One demonstration (2 minutes) followed by practice (2 minutes) followed by a second demonstration (2 minutes) followed by practice (2 minutes) followed by a third demonstration (2 minutes) followed by practice (2 minutes); total, 12 minutes.

Procedure d. Interspersed movie demonstrations: Movie (2 minutes), practice (2 minutes), movie (2 minutes), etc., for a total of 12 minutes.

In Study B there were also four different teaching procedures used to study (1) the effect of coaching during practice, and (2) regulated interspersed film viewing plus practice vs. free choice. A movie demonstration was used throughout. Coaching consisted of pointing out each individual's mistakes. The four procedures were:

Procedure a. Interspersed movie, no coaching during practice.

Procedure b. Free choice movie, no coaching during practice (movie ran continuously for 12 minutes; students could watch the film or practice, as they pleased, during this interval).

Procedure c. Interspersed movie, coaching during practice (a skilled instructor pointed out errors to each student during practice).

Procedure d. Free choice movie, coaching during practice.

The Procedure

In both studies there were four teaching procedures (named above) designated a, b, c, and d respectively.

In both studies there were the same four classes of students: Classes A, B. C, and D.

In both studies there were four tumbling skills, I, II, III, IV.

It was therefore possible to arrange the experimental procedures so that each class was taught each skill by a different procedure, as shown in the following table. This arrangement is known as a latin square design.

Study A

	Skills			
	I Backward Roll	II Cartwheel	III Handspring	IV Front Somersault
Classes				
A	a	b	c	d
B	b	c	d	a
C	c	d	a	b
D	b	c	d	a

Teaching Procedures (Described above)

From the latin square above, we see, for example, that Class A was taught skill I (backward roll) by means of procedure "a" (massed live demonstrations plus practice); Class A was taught skill II (cartwheel) by means of procedure "b" (massed movie demonstration followed by practice); Class B was taught skill I (backward roll) by means of procedure "b" (massed movie demonstrations) and skill II (cartwheel) by means of procedure "c" (live demonstrations interspersed with practice), and so on.

A similar latin square was designed for Study B.

In effect, these latin square designs meant that each class in Study A followed each of the four teaching procedures using a different procedure for each skill. No two classes were taught the same skill by the same procedure. The same was true for Study B.

By analysis of these latin squares it was possible to measure the relative effectiveness of the eight teaching procedures. Actually, two separate analyses were done for each sub-study; one was based on daily performance ratings, the other made on final judges' ratings.

RESULTS

Study A

1. Movie demonstration vs. live demonstration. The movie demonstrations proved about equally as effective as live demonstrations. This finding is in accord with the hypothesis that movie demonstrations may be at least as effective as live demonstrations.

2. Massed vs. Interspersed. The interspersed demonstrations, as measured by the final performance scores, were slightly superior to the massed demonstrations, but not significantly so. Measured by daily test scores, there was no difference.

   The hypothesis concerning this variable was not positively supported by the findings.

Study B

3. Interspersed Movie vs. Free Choice. Again based on two sets of scores, daily test scores and final performance scores, findings on the interspersed movie and free choice variable were consistent. Interspersed movie demonstration was superior to free choice (measured both by daily ratings and final ratings) but not at an acceptable level of statistical significance.

   The findings indicate support of the hypothesis, but do not positively confirm it.

4. Coaching vs. no coaching. Findings based on both types of scores were consistent. Coaching was significantly superior to no coaching. Results based on instructors' daily ratings showed coaching to be superior at the 5.0 per cent level of confidence; results based on the final performance tests showed coaching to be superior at the 1.0 per cent level of confidence.

   These findings are summarized in Table 1.

TABLE 1

MEANS OF SCORES ON EXPERIMENTAL FACTORS FOR DAILY RATINGS AND FINAL PERFORMANCE, AND SIGNIFICANCE OF DIFFERENCES (F-RATIOS)

Experimental Factor	Daily Rating Mean Score	F-ratio	Final Performance Mean Score	F-ratio
Live demonstration	5.80		6.07	
Movie demonstration	6.01	.94	6.28	.78
Massed demonstration	5.91		6.08	
Interspersed demonstration	5.90	.00	6.26	.54
Interspersed Movie	5.83	1.98	5.78	2.15
Free Choice	5.49		5.55	
Coaching	5.95	5.94*	5.91	9.23**
No Coaching	5.36		5.42	

* Significant at the 5.0% level of confidence
** Significant at the 1.0% level of confidence

CONCLUSIONS

1. In teaching the athletic skills of tumbling, a motion picture demonstration is at least as effective as a live instructor's demonstration.

2. There is some slight evidence that demonstrations interspersed with practice may be slightly superior to massed demonstrations (several repeated demonstrations followed by practice).

3. Regulated interspersion of movie demonstrations and practice appears to be somewhat more effective than the free choice of the learner to view the films as he wishes.

4. Coaching during practice makes a significant contribution to the learning of athletic skills. However, the results show that a fair level of proficiency in the skills can be taught without instructors.

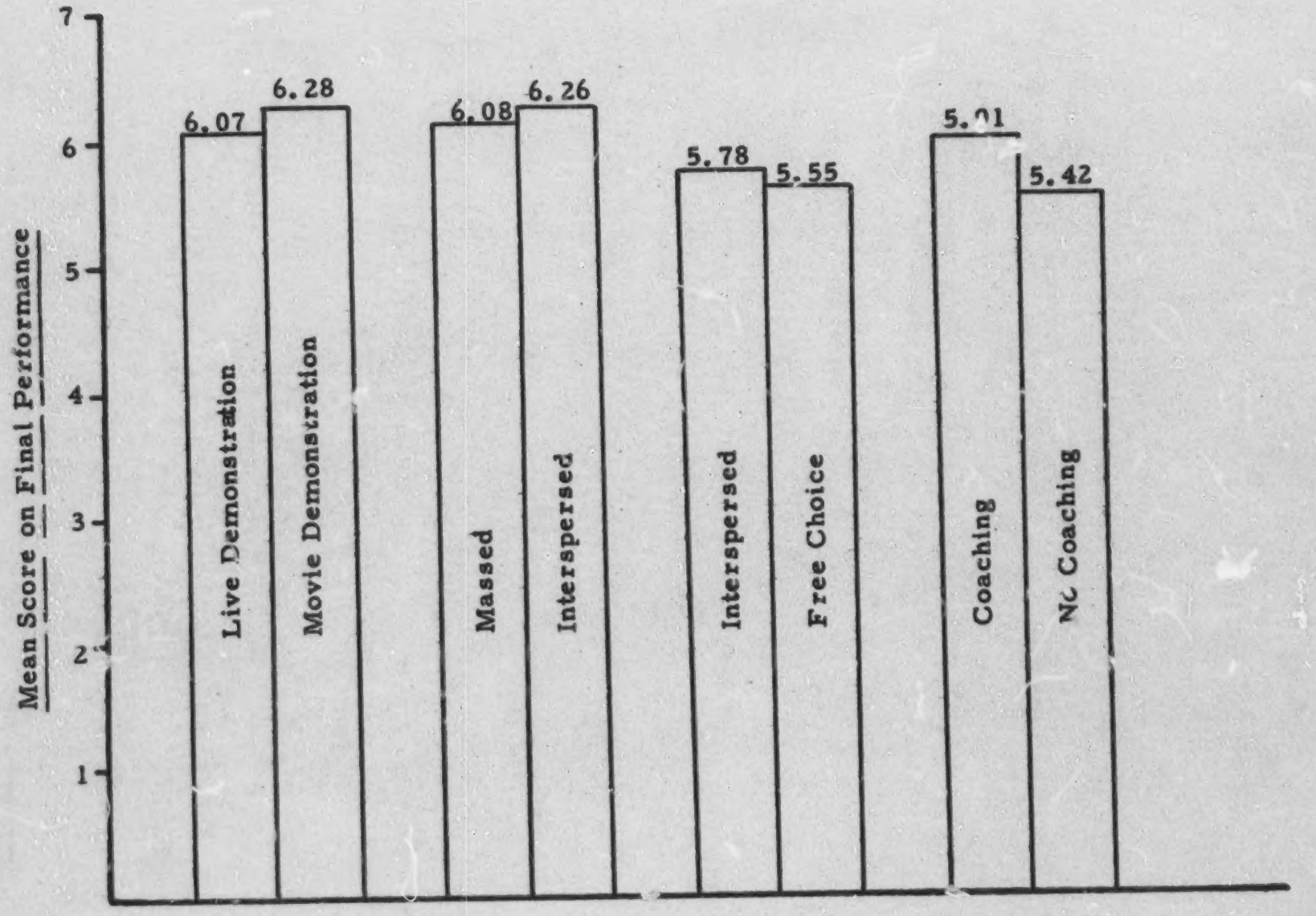

Fig. 3. Mean Scores (Final Performance Test) on Experimental Factors

RECOMMENDATIONS

On the basis of the findings on the four variables studied in this experiment, the following can be recommended as an effective practical procedure for teaching athletic skills:

1. Regulated viewing of movie demonstrations interspersed with practice.

2. Coaching during practice. (i.e., pointing out each learner's mistakes)

For convenience in following such a procedure, it is recommended that projection of film loops in daylight conditions at the practice area be employed.